

**CLAIMS**

1. A method for analysing the functionalities of the heart and of the  
5 respiratory system of a patient, comprising:
- segmenting cyclic heart beating  
sounds into physically defined  
classes and independently  
10 segmenting cyclic breathing cycle  
into physiologically defined classes;
  - associating segments of same class  
of said heart sounds with segments  
of same class of said breathing  
sounds, and
  - 15 • correlating physical characteristics of  
said heart sounds of same class with  
physical characteristics of said  
breathing sounds of same class.
- 20 2. A method for analyzing the functionality of the heart and the  
respiratory system as in claim 1, and wherein said cyclic heart  
beating sounds are synchronized by features of an EKG.
- 25 3. A method for analysing a change in the functionality of the heart  
and the respiratory system of a patient, comprising:
- identifying the respiratory activity  
and cardiac sounds;
  - segmenting said respiratory and  
30 said cardiac sounds;

- classifying said segments of said respiratory and said cardiac sounds;
  - extracting features of said classes;
  - 5       • comparing the features of said classes, and
  - determining the significance of the deviation of a set of said features from a respective set of baseline values .
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4.       A method for synchronizing a cardiac assist system , comprising:
- segmenting said respiratory activity and said cardiac sounds;
  - 15       • correlating physical characteristics of said heart sounds of same class with physical characteristics of said breathing sounds of same class;
  - determining the temporal signal structure of the heart,
  - 20       • sending control signal to the cardiac assist system.
5.       A system for monitoring the interrelated functionality of the heart and the respiratory system, comprising:
- 25       • means for collecting heart beating sounds;
  - means for collecting cyclic sound of the respiratory system, and

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- a means for processing said sounds.

6. A system for monitoring the interrelated functionality of the heart and the respiratory system as in claim 5 and wherein all sounds are collected by one means.

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